

Meeting Summary
Environmental Technology Verification Pilot
Wet Weather Flow Technologies
Stakeholder Advisory Group

March 23-24,1999
Atlanta, Georgia

(See [Attachment 1](#) for Attendance Record)

Introductory Remarks

NSF International and the US Environmental Protection Agency (EPA) hosted the second meeting of the Stakeholder Advisory Group (SAG) for the Wet Weather Flow Technologies (WWF) Pilot in Atlanta. John Schenk (NSF) and Mary Stinson (EPA) welcomed all participants and self-introductions were made. Kevin Smith (NSF) provided update on SAG membership including a breakdown of industry sectors, government agencies, municipalities, and industry associations represented. Four new members were added or have replaced other members since the November 1998 meeting.

John Schenk reviewed the agenda and outlined the meeting goals. For the benefit of those who were not in attendance at the 11/98 SAG meeting, a brief overview of the objectives of the ETV program and the WWF Pilot was also provided.

John Schenk recollected the priorities of technologies for verification that were established by the SAG at the November meeting:

Priority One (I) Technology Categories: High-Rate Inertial Separators; High-Rate Disinfection Technologies; Monitoring Equipment; Models; Storm Water Source Control

Priority Two (II) Technology Categories: Fine Screening; High-Rate Filtration; Flushing Systems; Street Sweepers

Priority Three (III) Technology Categories: Coarse Screening; High-Rate Biological Treatment; I/I Rehabilitation Technologies; Erosion Control Technologies

Technology Panels have been formed for each of the five Priority I technology categories. John Schenk noted that the Storm Water Source Control Technology Panel is also considering street sweepers, which had originally been designated as a separate category with a Priority II designation.

Pilot Procedures

Kevin Smith presented flow diagrams showing the significant steps involved in the Protocol Development phase and the Testing Phase of the WWF pilot (see attachment 2 for flowcharts). Mr. Smith explained that flexibility would be maintained for each technology category, the Protocol Development phase starts with the formation of a Technology Panel and culminates in the completion of a generic test protocol subject to review and comment by the Stakeholder Advisory Group and a public comment period. The important steps in the Testing Phase were highlighted from the acceptance of vendor applications, to the approval of technology-specific test plans, to the actual testing and issuance of a verification report. John Schenk stressed the desire of the ETV Program to see several verification reports issued in the near future, including 1999 if possible. The SAG and observers discussed the direction of the program. The discussion included the following points:

- Charles Rowney (CDM, Inc.) asked whether the Technology Panel would be involved in the review of the verification report. John Schenk said that NSF and EPA would likely need to consult with the Technology Panel during the approval of the verification report.
- Tom Maguire (MA DEP) suggested that the SAG review the verification reports for the purpose of ensuring the verification protocols remain fresh and relevant to users needs. The SAG recognized that a feedback loop should be present so that if the information reported in the verification reports proves to not adequately address Stakeholders needs, the Verification Protocol can be improved prior to subsequent testing.
- Adrian Saul (Univ. of Sheffield) suggested that there be a means of modifying the Verification Protocol and/or Test Plans, if necessary, after testing organizations have had the opportunity to run some preliminary tests according to the protocol. Technology Panels will need to consider whether "shakedown" testing should be conducted and under what conditions a Protocol or test plan should be amended in the event one or more parts of the test proves infeasible or inadequate.
- Steve McLaughlin (ME DEP) asked whether the Stakeholder Advisory Group would be reviewing the Verification Protocols during development. It was explained that any member of the SAG who expressed an interest in reviewing a Draft Protocol could do so at the time that the Technology Panel is conducting its review. The SAG could also be called upon to help resolve disputes that may arise at the Technology Panel review step.
- Bill Anderson (AAEE) cautioned that the ability of the Pilot to develop technically sound and appropriate verification protocols may be constrained if overly aggressive deadlines for verification reports are established.
- Remy Stachowiak (US Filter) stressed while all protocols do need to be technically sound, costs of testing need to be kept in check and that the most comprehensive test protocol is not necessarily the best one for this type of program.

High Rate Separation and Clarification Technologies

On Day 1, John Schenk provided an update on the progress, direction, and issues associated with the verification of High Rate Separation and Clarification Technologies. The two areas of focus for the Technology Panel continue to be vortex/hydrodynamic separators and enhanced clarification technologies.

Jim Dougherty (Kruger, Inc.) asked whether the ETV program would serve to help standardize the discharge limits established by EPA, which at this time can vary from Region to Region. It was explained that this Pilot is not intended to drive regulatory reform or approve a technology based on its ability to meet existing regulations. SAG members highlighted the fact that completed verification of a technology will not eliminate site-specific pilot testing, but should significantly reduce the frequency and scope of pilot or demonstration testing required by communities and regulatory agencies. Charles Rowney suggested that some level of academic oversight of the protocol development may help ensure it will withstand scrutiny over time.

Steve Hides (H.I.L. Technologies) presented a vendor's perspective on the potential benefits and disadvantages of verification and the technical issues, options and challenges facing the Pilot. He outlined areas where the Pilot should seek to provide objective, quality assured performance data to all parties in the WWF marketplace.

Mr. Hides believes vendors stand to benefit from comprehensive and independent field verification of manufacturers' performance claims through improved market acceptance of the technology, networking and the generation of reference materials for regulators, consultants and engineers. Mr. Hides also expressed concerns about the ability to establish a level playing field, as comparisons will inevitably be made after verification reports are issued. He stressed that the field testing must be impartial, timely, and of reasonable cost. He expressed concerns about how representative the results will be, as wet weather problems tend to be site- and event- specific.

Mr. Hides highlighted several of the technical issues that must be addressed and agreed upon during protocol development including scaling factors, test duration, sampling techniques and how variations in flow and wastestream characteristics are to be addressed.

On Day 2, the Technology Panel on High Rate Separation was convened in breakout session. George Zukovs of XCG Consultants was selected as the chairman. Following the breakout session, Mr. Zukovs presented the SAG with a summary of the discussion and conclusions reached by the Panel (see Attachment 3 for summary prepared by G. Zukovs).

High Rate Disinfection Technologies

Kevin Smith provided a status report on High Rate Disinfection Technologies, including a summary of the Technology Panel's recent teleconference. Mr. Smith explained that the

Panel was initially comprised of consultants only who have helped define an appropriate scope of activities. Based on Panel input, NSF will seek the participation of vendors and other experts in three main areas: UV and other radiation; chemical disinfection; and mixing technologies.

Bill Cairns (Trojan Technologies) gave a presentation on some of the difficulties that will be associated with verifying a technology such as UV disinfection whose design and therefore efficacy is dependent upon the level of pretreatment and several site-specific water quality factors. Dr. Cairns indicated one needs to know what equipment is needed as part of a complete system for a particular application before efficacy can be validated. Debate followed as to whether verification of UV disinfection can be verified separately from other components of the treatment train. This debate would be continued at the Technology Panel level.

On Day 2, the Technology Panel on High Rate Separation was convened in a breakout session. Karl Scheible of Hydroqual, Inc. was selected as chairman. Following the breakout session, Tom Stevens (NSF), Bill Cairns, and Karl Scheible summarized the Panel discussions. Technology Panel discussions focussed on radiation technologies as the only two vendor participants represented UV system manufacturers. Panel membership needs to be expanded to represent the various disinfection technologies.

The effort of defining the bounds of verification of disinfection technologies such as UV or chemical oxidants as been started. The Panel agreed that it was important to agree to a way to benchmark a given system's performance. In the case of UV, this essentially means evaluating how efficiently dose is delivered, under conditions representative of wet weather flows, which may best be set by the water's transmissivity at the wavelengths applicable to the technology. The evaluation of chemical oxidant-related technologies will likely be more involved including looking at associated by-products. The Panel is also considering the feasibility and value of addressing a system's reliability, costs and safety.

Flow Monitoring Equipment

Kevin Smith presented a review of progress made by the Technology Panel on Flow Monitoring Equipment. The Panel has suggested the initial focus be on flow meters used for CSO and storm water applications and that sampling equipment and sensors/water quality monitors should be considered at a later date. The Panel has recommended that verification should include both a laboratory and field component.

Pat Stevens of ADS Environmental Systems made a presentation to the SAG on a possible approach to verification of depth and velocity meters. Mr. Stevens believes the industry should focus on depth and velocity and the precision and bias associated with their measurement, rather than strictly the reported accuracy of flow (Q). Mr. Stevens showed several graphs indicating that reporting on the precision and bias of the sensors

over a range of flows will provide more information about how well a flow meter is working than simply comparing the recorded Q to a reference flow rate. Some disagreed, saying that the purchasers of the meters simply want to know if the flow being recorded reflects the actual flow. Charles Rowney suggested that failure diagnosis is likely beyond the scope of the verification.

On Day 2, the Technology Panel on Flow Monitoring Equipment was convened in a breakout session. The Panel felt NSF should act as the facilitator of the Panel and thus did not select a Chairperson. Following the breakout session, Kevin Smith presented the SAG with a summary of the Panel discussions:

- The Panel continued to support having a field and laboratory component. The lab component will largely verify the accuracy of the meter by reporting on Q, velocity and depth under a limited number of controlled conditions.
- Panel will review the notes of Steve Barfuss of Utah State Univ. to identify the critical variables and data points for laboratory verification.
- Many manufacturers may already have a significant portion of the data that may ultimately be required for verification. The Pilot may need to define the conditions under which such data may be considered.
- Field-testing should verify accuracy under real world conditions while recognizing that there are limitations with respect to any feasible reference method established.
- Field-testing will focus on more qualitative measurements such as meter operation and maintenance, time between failures, installation issues, and user friendliness.
- The range of desired flow conditions and pipe sizes must be defined and those sites must be identified that achieve the conditions.
- Panel will critique a preliminary proposal put forth by BPR Consultants to conduct verification testing at the Quebec Urban Community facilities. Panel will develop a list of questions for BPR to determine if the site may be suitable.

Wet Weather Modeling

John Schenk updated the group on the verification of wet weather models. A Technology Panel has been formed, with Charles Rowney serving as chairman and Limno-Tech Inc. having been selected as the primary protocol developer. While preliminary discussions have focused on landside models rather than receiving water models, John Schenk indicated that many difficult questions remain in simply defining the scope of the verification. John Marr of Limno-Tech made a brief presentation in which he raised some of the questions facing the Technology Panel. SAG members asked about vendor interest in verification. John Marr explained that there are several vendors in the marketplace, but that the panel will need to better define the approach and what model functions are under consideration before vendor solicitation takes place.

On Day 2, Charles Rowney presented ideas aimed at defining what types of models and model features should be verified. Charles Rowney and John Marr have proposed a preliminary ranking of various model features or characteristics based on their relevance in five areas: 1) Market heat; 2) Maturity; 3) Cost to evaluate; 4) Competition; and 5) Target audience. Based on early discussions, Mr. Rowney and Mr. Marr have suggested that verification may initially focus on the model having the following features/functions:

- Quantity
- Simulation
- Representation & Interpretation
- Planning & Design
- Urban
- Surface & Conveyance

There was some discussion as to whether water quality models should be a verification priority. It was suggested that while models are used for water quality determinations, most wet weather modeling applications start with water quantity. The full Technology Panel will consider these recommendations. Charles Rowney also provided an overview and sought SAG input on some of the testing issues to be addressed by the Technology Panel, including:

- Field vs. Lab vs. Theory
- Evaluating components within Comprehensive Models
- Level of Abstraction (Physical>Conceptual> Algorithm> Solution>Code> Executable)
- How to address embedded, non-proprietary codes (e.g., SWMM)
- Computer platform (validate against Unix, Windows, etc.?)

Storm Water Source Control Technologies

Kevin Smith updated the SAG on activities in the area of storm water source control technologies, indicating that the initial focus has been on storm water treatment technologies and street sweepers. The Technology Panel had suggested that protocol work done by EvTEC, another ETV pilot, on highway runoff treatment technologies may provide a good basis for a protocol for more other storm water technology applications. The Technology Panel also suggested that verification of a pressurized filtration system installed in Green Bay, WI also be pursued.

On Day 2, the Technology Panel on Storm Water Source Control Technologies was convened in a breakout session. Roger Bannerman was selected to serve as the Chairperson. Following the breakout session, Mr. Bannerman presented the SAG with a summary of the Panel discussions:

- The Panel developed the definition of *source control technology as a storm water control device used in established urban areas to reduce pollutant loads before the beginning of the public conveyance system.*
- The Panel further refined the categories of technologies for which test protocols are needed:
 - Filtration devices
 - Surface Water Inlet Inserts
 - Phase Separators
 - Street Sweepers
- Protocol development should focus on water quality/treatment claims made by manufacturers.
- Two Protocols will be developed simultaneously, one generic protocol for source control technologies and one specific protocol/test plan for the pressurized filtration system installed at St. Mary's Hospital in Green Bay, WI.
- The Panel will prepare a RFP for the contractual development of the generic test protocol. The Panel will establish guidelines to be forwarded to the protocol developer with a goal of having a protocol complete in June 1999.

Source Water Quality Protection Technologies ETV Pilot

Tom Stevens, NSF Pilot Manager, provided an update on the activities of the Source Water Quality Protection Technologies ETV Pilot. NSF and EPA initiated the Source Water Protection (SWP) Pilot at the same time as the WWF Pilot. The SWP Pilot will focus on decentralized wastewater treatment technologies and perhaps infrastructure technologies and agricultural activities. Mr. Stevens highlighted areas in which joint efforts between the WWF pilot and the Source Water Protection (SWP) Pilot may reduce costs and benefit all stakeholders. Potential joint efforts include catch basin/manhole cleaning technologies, oil/hydrocarbon separation technologies and sewer rehabilitation technologies.

WWF Pilot Funding

John Schenk presented an overview of anticipated funding for the different pilot activities including the following highlights:

- Pilot funds will likely cover all costs associated with project administration, development of Protocols and preparation of the verification report.
- Cost of developing technology specific test plans and conducting the testing will be covered by Pilot funds, vendor contributions and other sources such as the organization conducting testing or municipalities.
- Technology and the necessary equipment and support personnel will be provided by the vendor and perhaps the community where the test is being conducted.

When asked if specific dollar amounts of Pilot funds were designated for protocol development activities, Dr. Schenk stated that as much as \$25-30K is available for development of each protocol. With respect to testing costs, Dr. Schenk also explained that a certain percentage will be covered by pilot funds up to an established cap. The specific percentage and cap will be based on how many verifications are anticipated for a given technology category within the pilot period.

Outreach

Kevin Smith provided an overview of ongoing and planned outreach activities. NSF will represent the pilot at a number of national conferences in 1999 including ASCE (June), NEHA (July), AMSA (July), WEF O& M Specialty Conference (August), and WEFTEC (October). Some outreach efforts for the WWF Pilot will be conducted in conjunction with the two other ETV Pilots being managed by NSF (Source Water Quality Protection Technologies and Package Drinking Water Treatment Systems). Mr. Smith encouraged SAG members and others to notify NSF if they are aware of a conference, show, or meeting that may provide an opportunity to share information about the Pilot with interested parties. It was suggested that the Pilot have representation at the New England Innovative Storm Water Technologies Trade Show in Providence, RI in May. The SAG was reminded to refer others of the NSF and EPA websites for more information about the pilot. Bill Anderson suggested that pilot information be provided to the webpages of industry associations such as APWA, WEF, and ASCE.

Kevin Smith indicated that a general press release would be distributed to relevant publications after the meeting. A brief summary of the meeting would also be distributed to the SAG shortly after the meeting. The complete summary (this document) will also be available for review by the SAG prior to its posting on the EPA and NSF Websites.

Project Timeline/ Next Meeting

John Schenk outlined a tentative schedule for the Pilot with the goal of initiating field testing as soon as possible, perhaps in summer 1999. In the interim, Technology Panels and Vendor Panels will be reconvened as necessary. NSF anticipates that Draft protocols in each of the Priority One technology categories could be available for Technology Panel review in June of 1999. For some technology categories, separate vendor panels may need to be convened. For technologies with sites already available, the Pilot will attempt to fast track the development and review of protocols and site specific test plans. Bill Anderson expressed concern that this schedule may be too aggressive given that SAG members that are representing organizations may wish to allow their members to review and comment on Draft protocols. John assured the group that all interested parties would be given the chance to review the documents but that the review periods would need to be fairly short. Steve Hides noted that for many vendors the funds available for

testing under a program such as ETV will not be available in the 1999 budget and thus vendors may be unable to participate if testing started this summer.

NSF proposed that the SAG be convened again in the fall. The next meeting was tentatively planned for the 2nd week in November in a Midwestern location such as St. Louis, Chicago, or Detroit. This will allow time for Technology Panels and Vendor Panels to convene and make progress on verification protocols.

John Schenk thanked all for their participation and adjourned the meeting.

Visit to the Columbus Water Works' Advanced Demonstration Facility

On March 25, fifteen individuals attending the SAG meeting also toured the Advanced Demonstration Facility of the Columbus (GA) Water Works CSO Control Program. Clifford Arnett (Columbus Water Works) and Mark Boner (WWETCO) hosted the group and provided a close-up look at a number technological controls implemented as part of a \$95 million CSO control program for the City of Columbus. Heavy rains that day afforded the group the opportunity to see the facility in full operation.

Attachment 1- Attendance Record - March 23 & 24, 1999

ETV Stakeholder Advisory Group Meeting Wet Weather Flow Technologies Pilot Atlanta, GA

Stakeholder Advisory Group Members

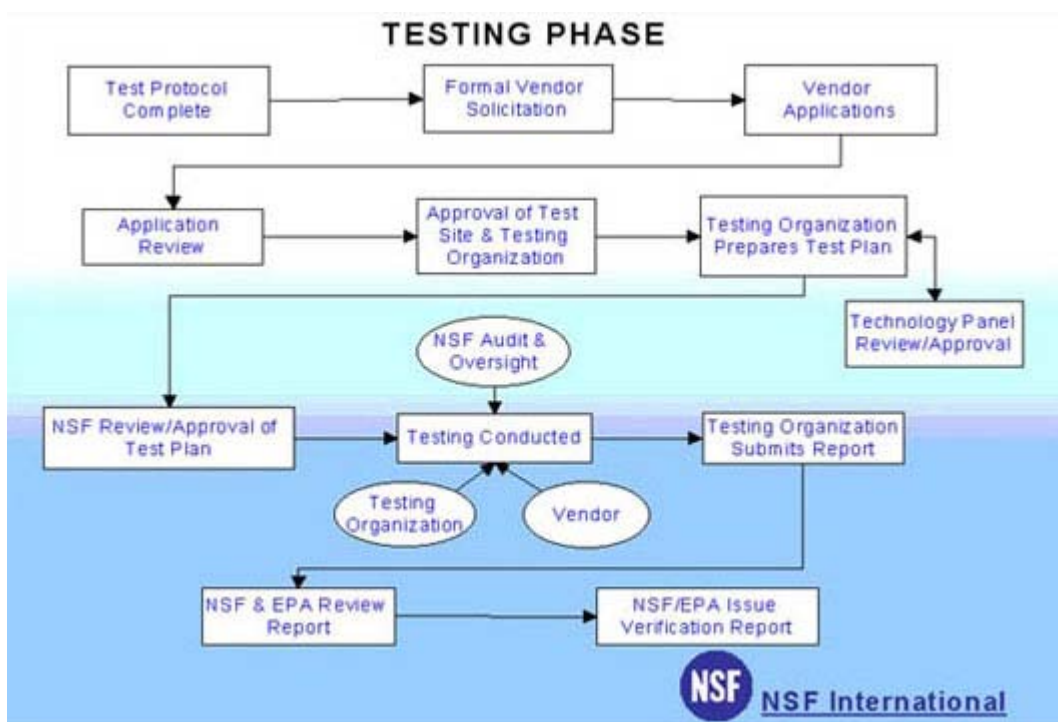
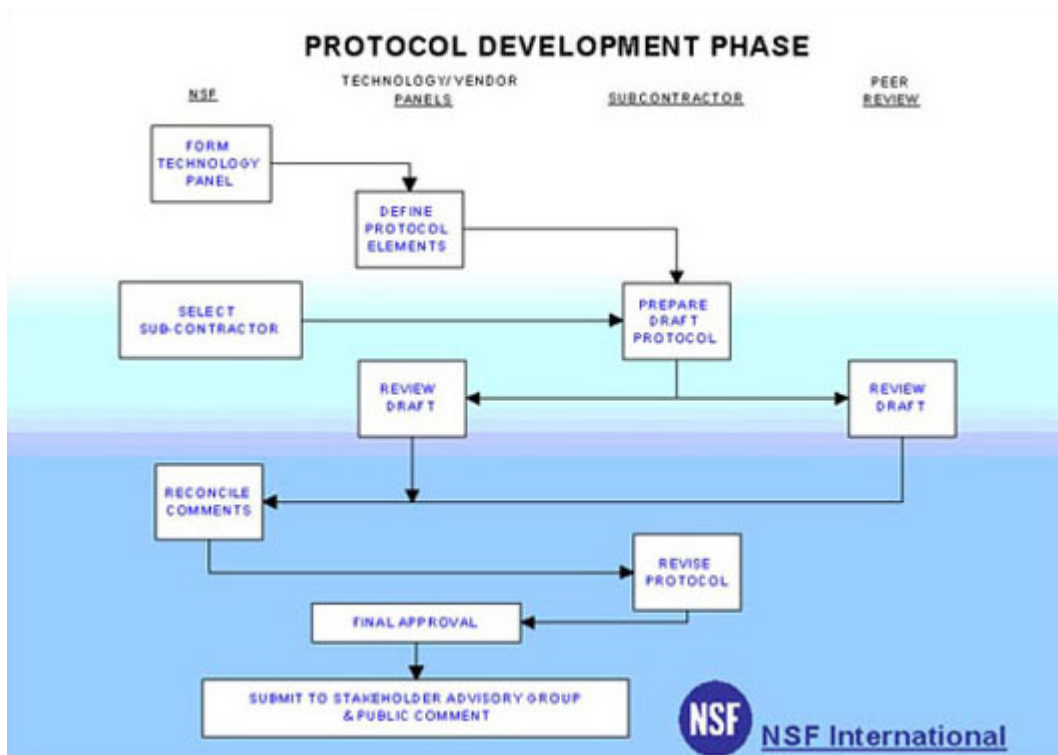
William Anderson, AAEE
Roger Bannerman, WI DNR
Dennis Dembiec, City of Birmingham
Bill Cairns, Trojan Technologies, Inc.
Patricia Czenas, US DOT Fed Hwy. Admin.
Jim Daugherty, Krüger (for P. Topalian)
Kenneth Eyre, Greeley & Hansen
Steve Hides, HIL Technology, Inc
Warren Kurtz, NYC DEP
Thomas Maguire, MA DEP
Keith McCormack, Hubbell, Roth & Clark
Stephen McLaughlin, ME DEP
Charles Rowney, Camp, Dresser & McKee
Remy Stachowiak, US Filter

Pilot Administration

John Schenk, NSF International
Kevin Smith, NSF International
Tom Stevens, NSF International
Mary Stinson, US EPA

Observers

Meei-Lih Ahmad, City/Cnty. of San Francisco
Greg Anderson, Woolpert LLP
James Bachhuber, Earth Tech
Steven Barfuss, Utah State University
Stephanie Barrett, ICF Kaiser
Michael Bloom, Roy E. Weston, Inc.
Charles Crandall, CH2M Hill
Daniel Davis, Moffa & Associates
Greg DeSantis, American Sigma
Doug Flanagan, American Sigma
Todd Garber, American Sigma
David Gray, MA DEP
Jay Knight, Knight Treatment Systems, Inc.
John Marr, Limno-Tech, Inc.
Raj Natarajan, Renaissance Instruments
Mark Noga, Knight Treatment Systems
Gabriel Novac, Grande, Novac & Assoc. Inc.
Bill Orne, Woolpert LLP
Tyler Richards, City of Atlanta
Adrian Saul, University of Sheffield, UK
Karl Scheible, HydroQual, Inc.
David Schumacher, Deuchler Associates, Inc.
Pat Stevens, ADS Environmental
Michael Stieferman, Radian International, Inc.
Richard Thomas, Aquionics, Inc.
Peter Young, Hazen and Sawyer, PC
George Zukovs, XCG Consultants



Attachment 3 - Notes from Breakout Session - Technology Panel on High Rate Separation

1. Existing Protocols and Test Programs

A number of existing test protocols and testing programs were identified by panel members. They include:

New York City	High Rate Physical Chemical Treatment Pilot Procedures and Protocol
Forth Worth	Enhanced High Rate Clarification Pilot Testing Protocol
Actiflo	CSO Pilot Testing Protocol
Microsep	BFR Pilot Protocol for Demonstration Study
Jefferson County (Alabama)	Details not available (should acquire)

2. **Separate Protocols**

Panel members discussed separating the protocols for high rate flocculation / clarification from vortex separators. It was agreed that discrete protocols would be developed for each of these technologies. A possible third protocol or amended protocol may be required for vortex separators operating with coagulant addition.

3. **Operating Conditions**

Panel members observed that in order for the test protocols to be useful, they should consider a number of "operating points". The operating points would encompass a range of flowrates and, in the case of high rate flocculation/clarification facilities, coagulant addition conditions. It was agreed that protocols for both the high rate flocculation/clarification and the vortex separators would include a number of operating points.

4. **Parameter Selection**

Panel members discussed parameter selection for evaluation of pilot or prototype units. Suggested parameters for each technology included:

Vortex

Particle Size Distribution

- TSS
- VSS
- Floatables
- Settleable Solids
- BOD
- COD
- Bacteria (fecal coliforms)

High Rate Flocculation/Clarification

Particle Size Distribution

- TSS
- VSS
- BOD
- COD
- Bacteria (fecal coliforms)
- Turbidity
- TKN
- Total P

coliforms)

- Oil & Grease
- Metals (Selected metals)
- UV absorbance @ 254 nm

Depending upon circumstances, additional parameters could be added or subtracted to either list. For vortex separators operating with coagulant addition, a final parameter list will need to be confirmed.

5. **Test Conditions**

Panel members discussed test conditions and presented the following key ideas:

- Testing in order to be practical should ideally be in the range of 30 to 60 days in duration
- "Simulated" wet weather flow will need to be used as feed to the test units in order to obtain a reasonable amount of data within the 30-60 day timeframe. Every effort should be made to match the simulated wet weather flow with actual conditions. Suggestions for parameters used to assess simulated vs. actual flows included TSS, BOD and PSD. Other parameters may need to be considered.
- During the testing period, the treatment units should ideally also be evaluated under actual storm conditions.
- The high rate flocculation/clarification units all require some degree of preliminary treatment (i.e. screening and degritting). Preliminary treatment requirements should be listed in the final protocol.
- Test conditions should be carried out at a number of operating points. (See Item 3 above).
- Time varying as well as steady-state flows should be used in the protocol to reflect both start-up conditions as well as dynamic operation.
- Ideally, multiple vendors should employ a common site(s) for evaluation. It was felt that technology evaluations using common feed conditions would minimize the influence of differences in wet weather flow quality upon performance.

6. **Scale-Up**

Panel members discussed the issue of scale-up of treatment units.

In general, the available high rate flocculation/clarification treatment units are in the capacity range from 0.5 to 1.0 MGD. It was noted that, while some applications may fall within this size range, future prototype units would likely be of a much larger size. Panel members noted that plans for a prototype high rate flocculation/clarification unit at 50 MGD capacity are being considered in New York City, while a ~500 MGD unit is under construction in Paris. The Parisian facility was designed using data from a much smaller capacity unit, and should provide valuable details regarding scale-up

It was the feeling of the panel members that protocol development and unit testing could proceed at the smaller scale and would in time be supplemented by results from larger units. It was noted that sizeable vortex separator units exist in the United States and would afford opportunities for evaluation of larger scale facilities under the test protocol.